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Izumi

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(54) **LOADING APPARATUS FOR CARD TYPE RECORDING MEDIUMS**

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G06K 13/00 (2006.01)

(52) **U.S. Cl.** **235/381; 235/475**

(58) **Field of Classification Search** 235/441, 235/486, 487, 475, 479, 483, 381, 383, 492
See application file for complete search history.

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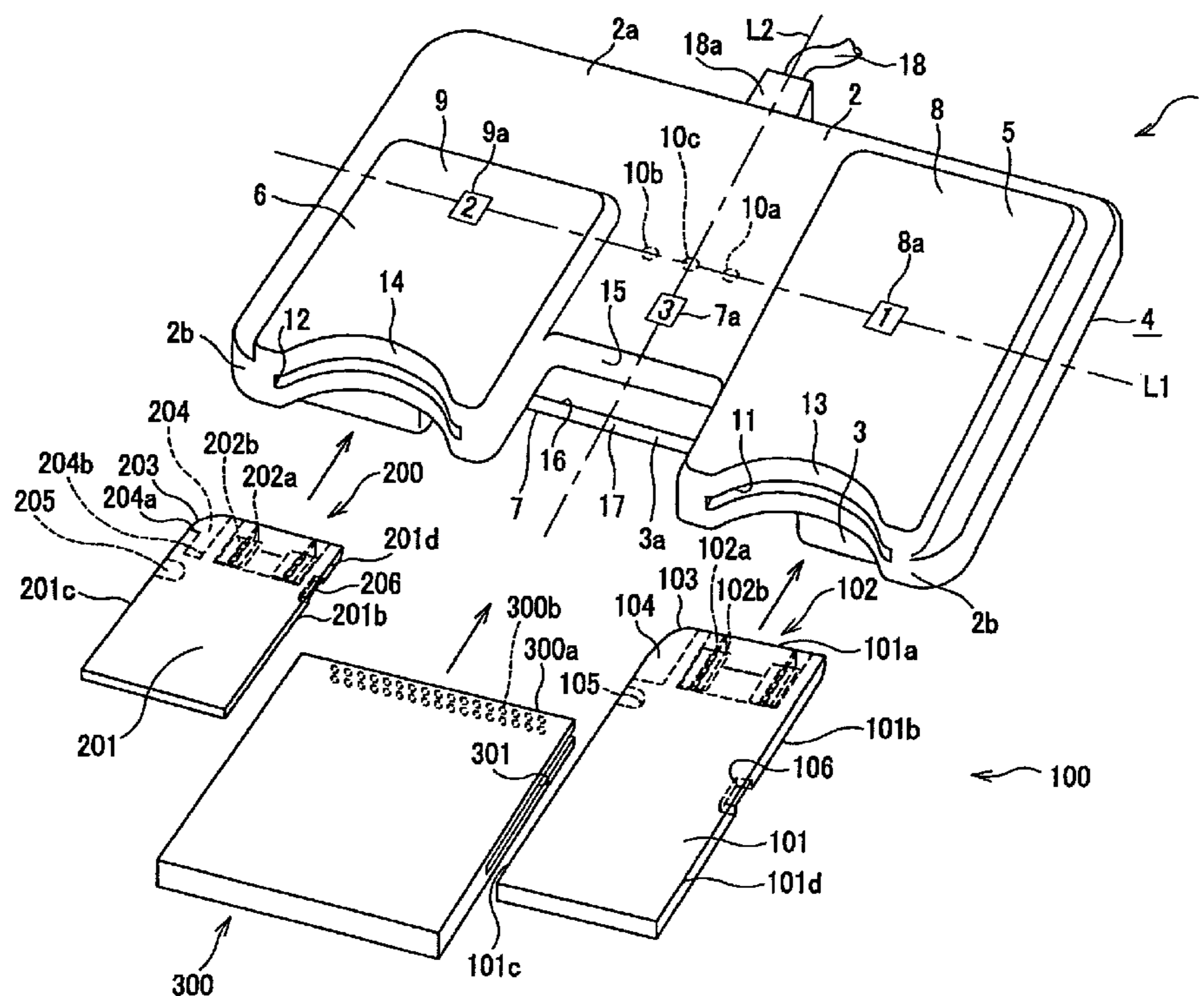
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(57) **ABSTRACT**

A loading apparatus for card type recording mediums comprises a first loading section for receiving a first IC card and a second loading section for receiving a second IC card, the first loading section and the second loading section being arranged in parallel with each other at the side of the top surface of the apparatus, along with a third loading section for receiving a third IC card arranged at the side of the bottom surface of the apparatus. The apparatus main body is connected to a host apparatus such as a personal computer by way of a cable. The first and second loading sections are provided with respective bulged sections showing plan views similar to those of the IC cards to be received therein so that the user can identify the loading sections simply by touching them.

9 Claims, 11 Drawing Sheets



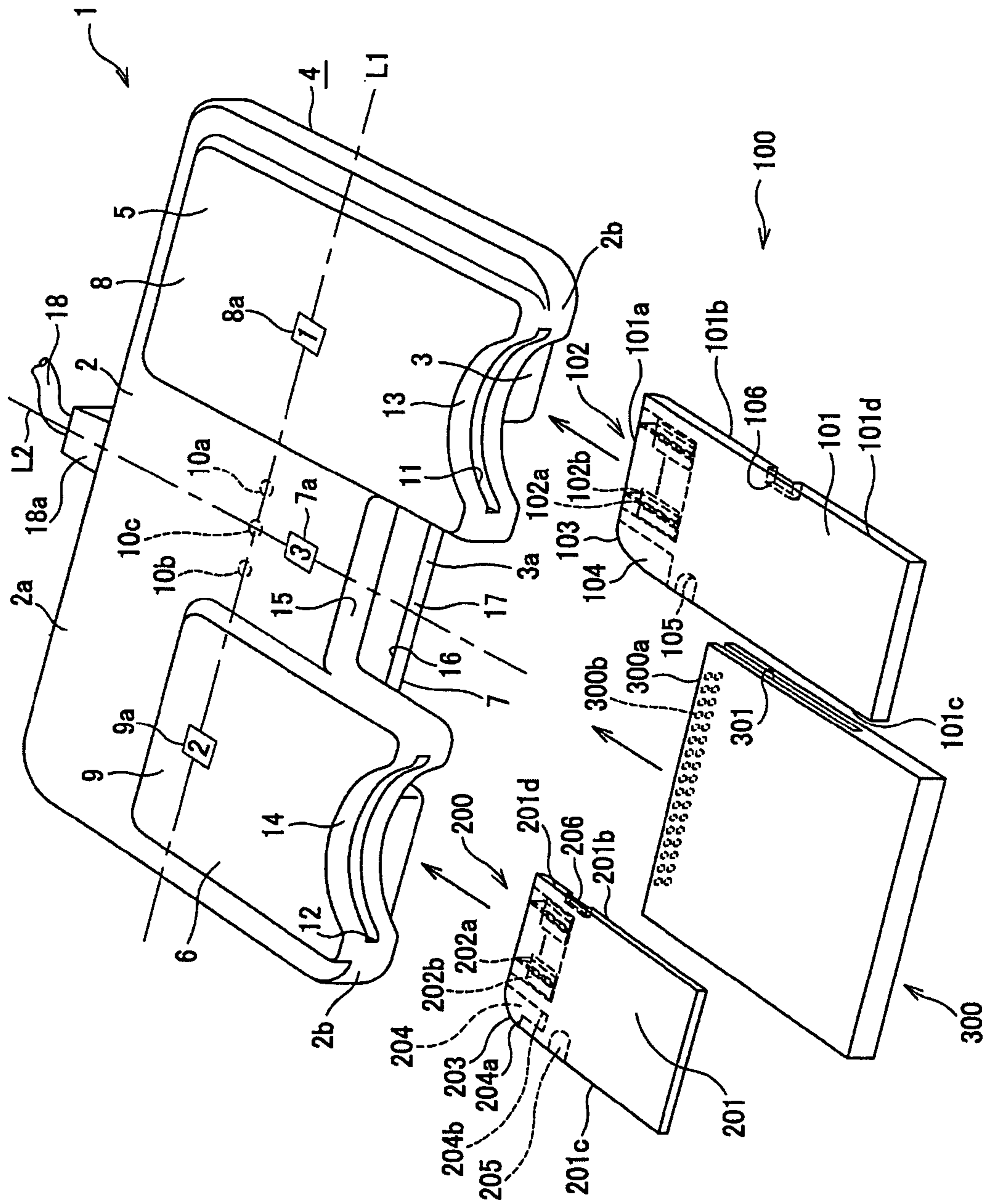


FIG. 1

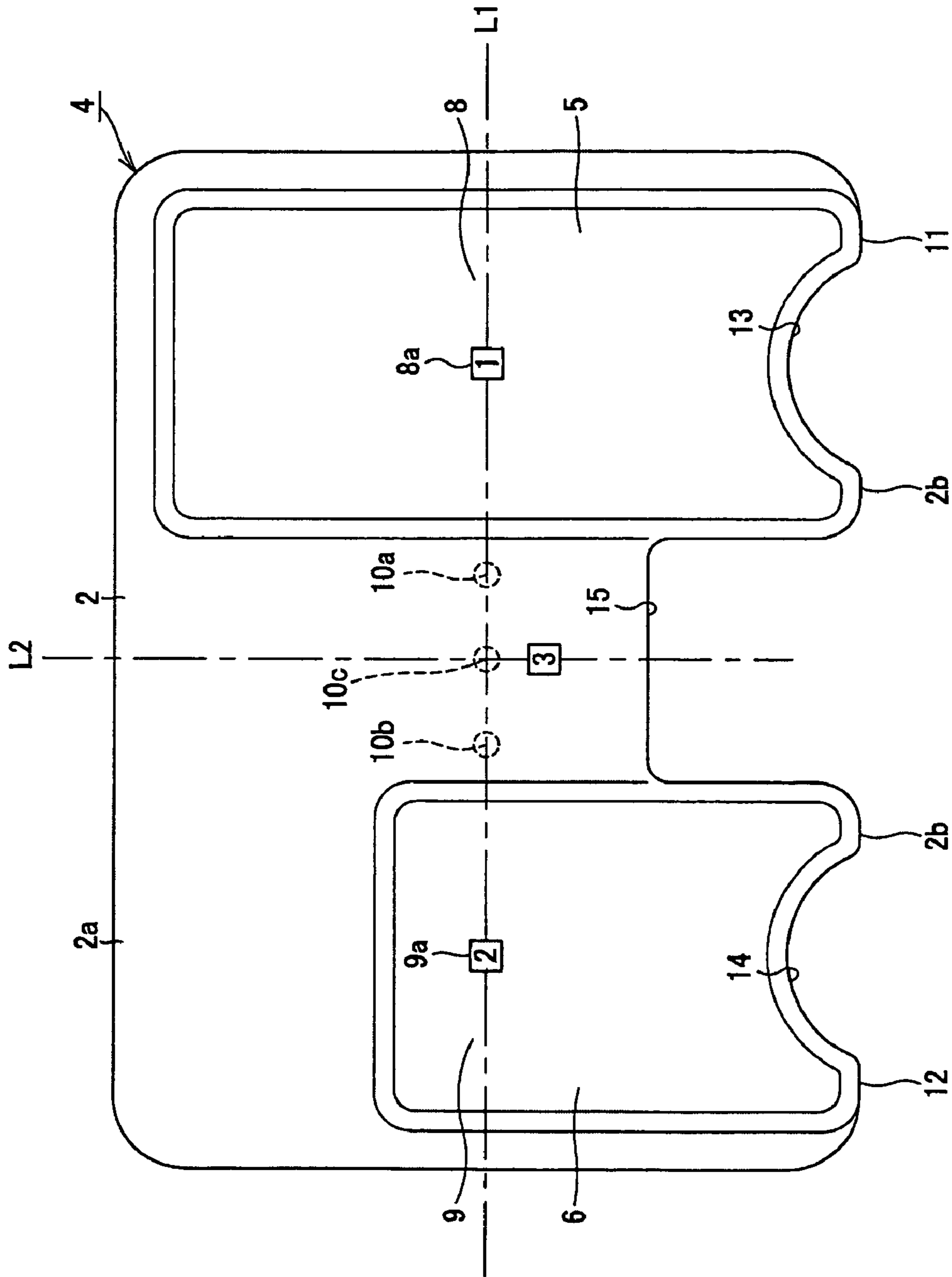


FIG.2

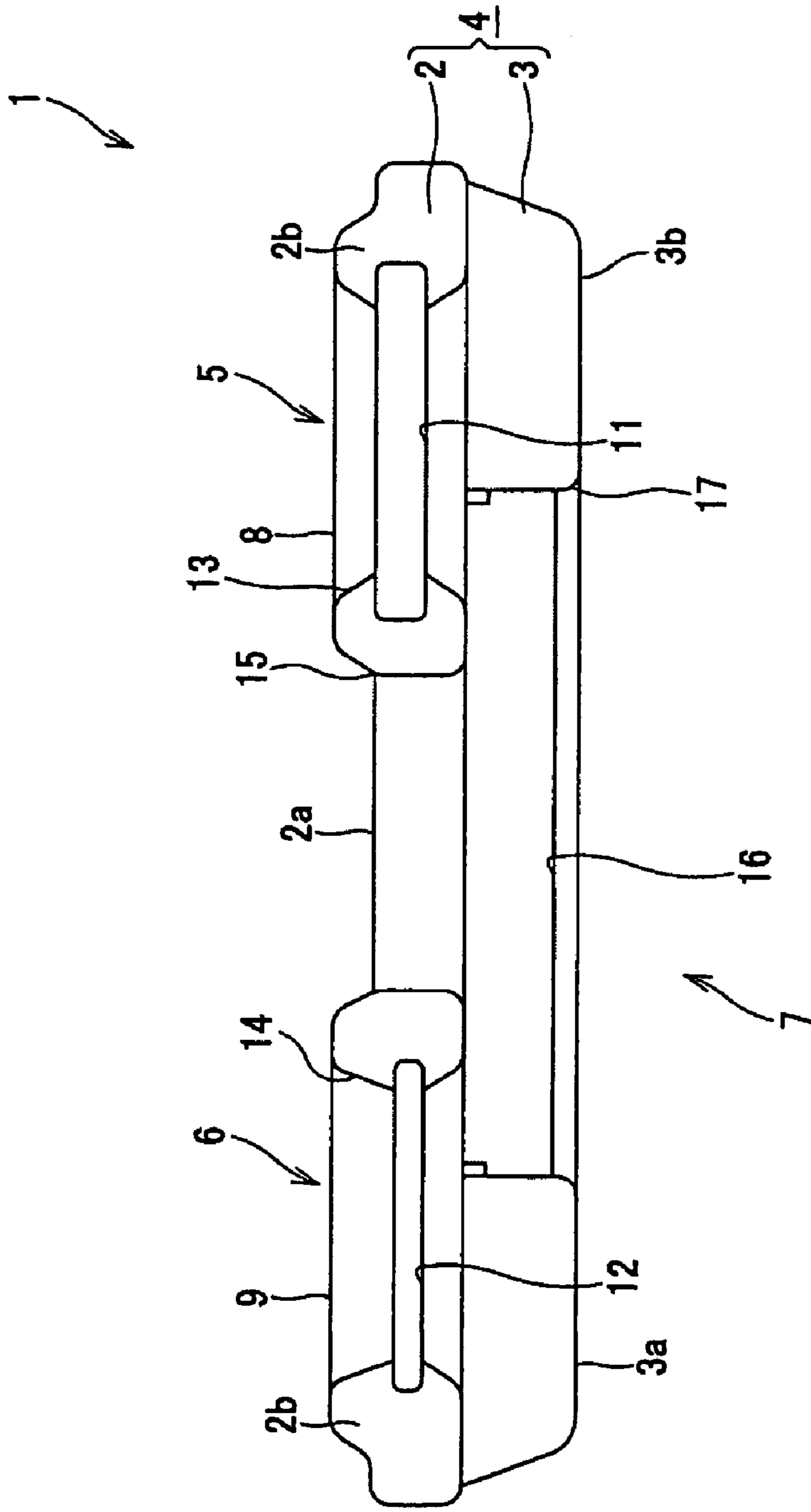


FIG. 3

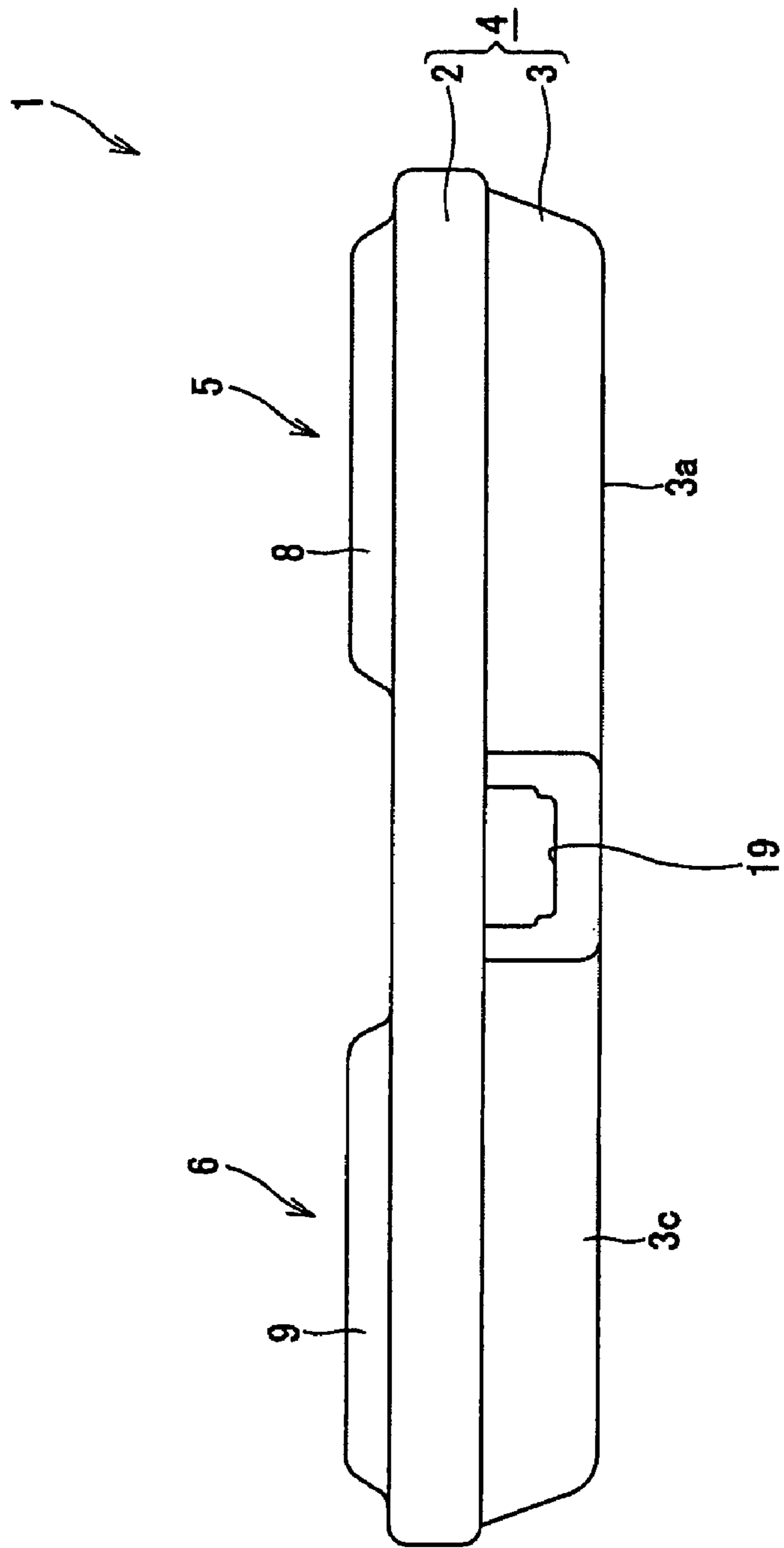


FIG. 4

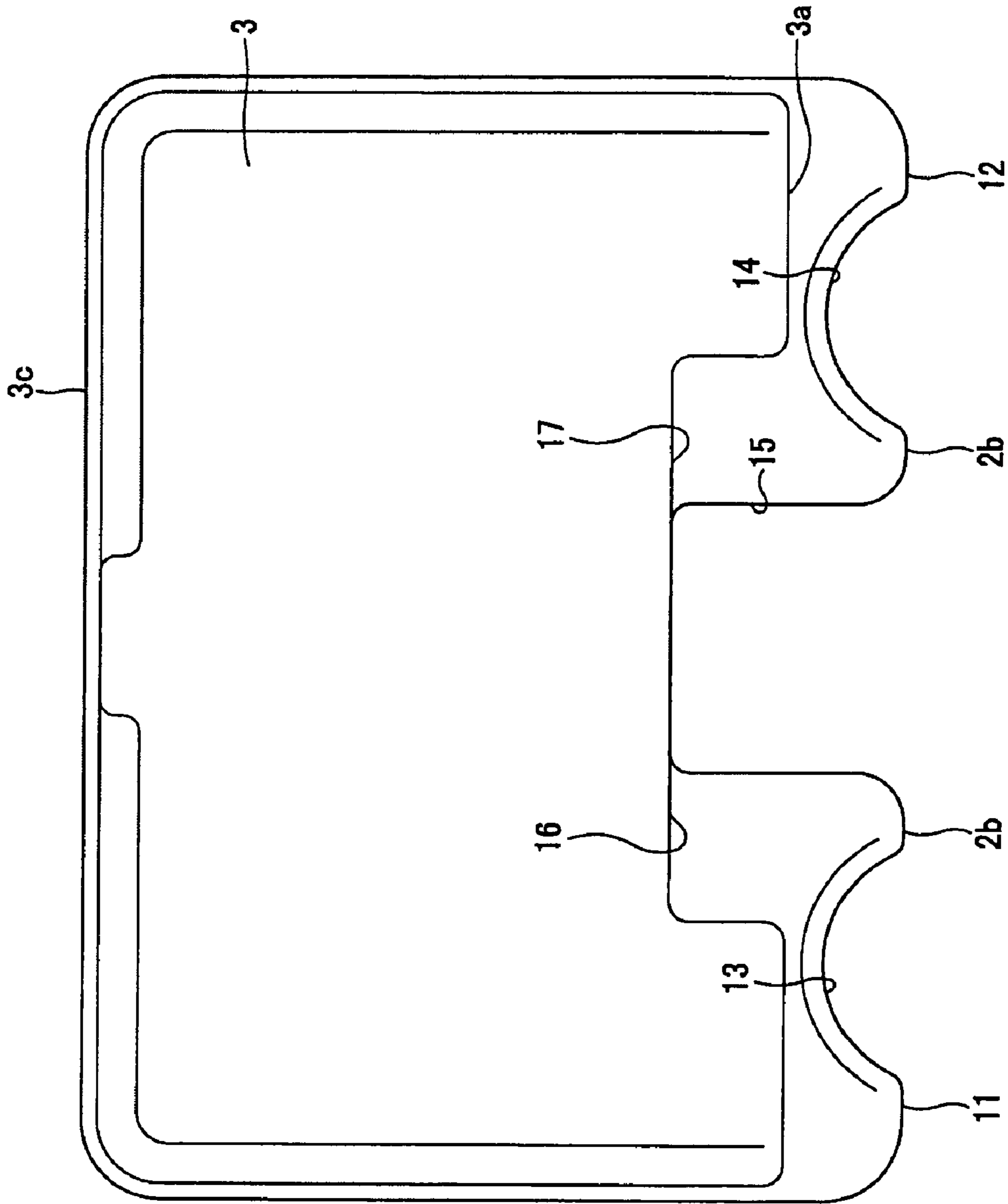


FIG. 5

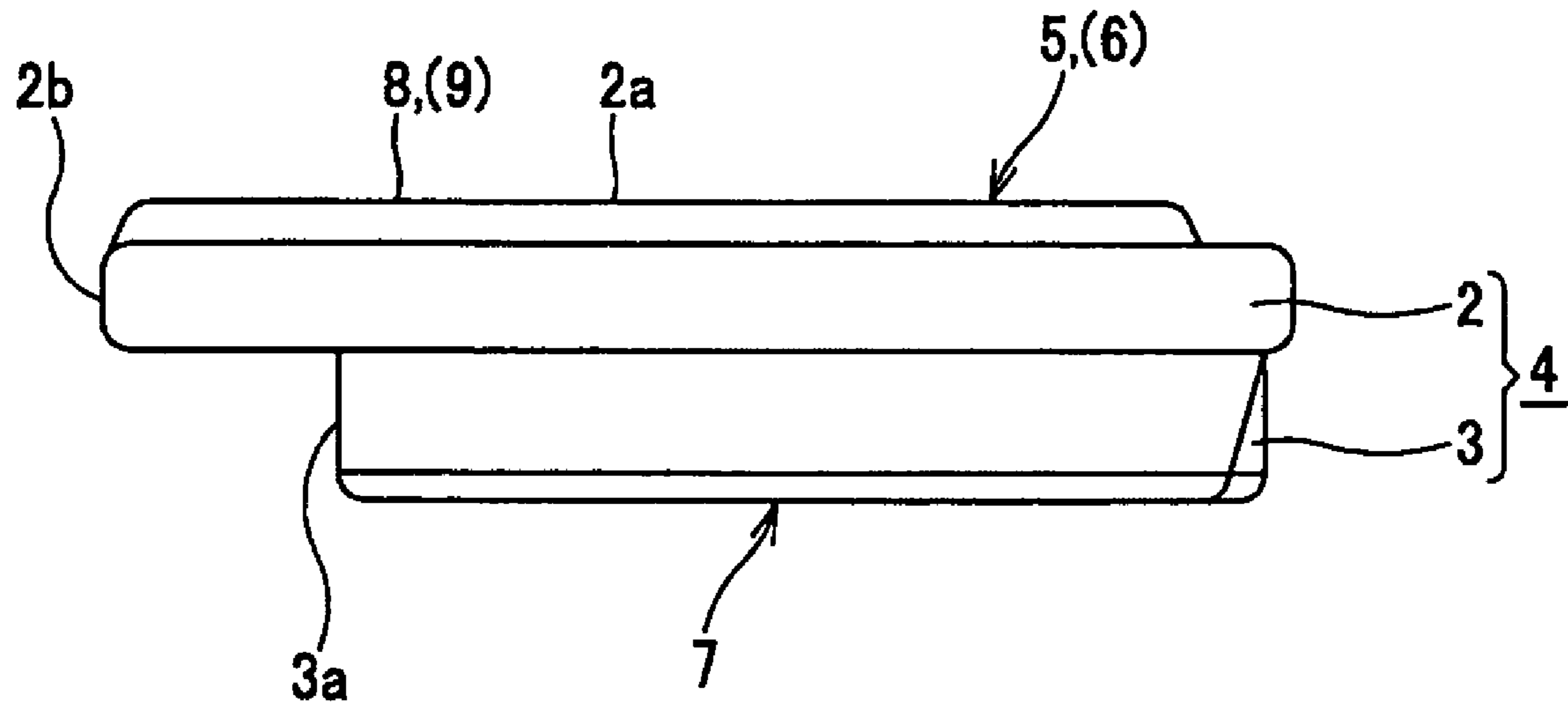


FIG.6

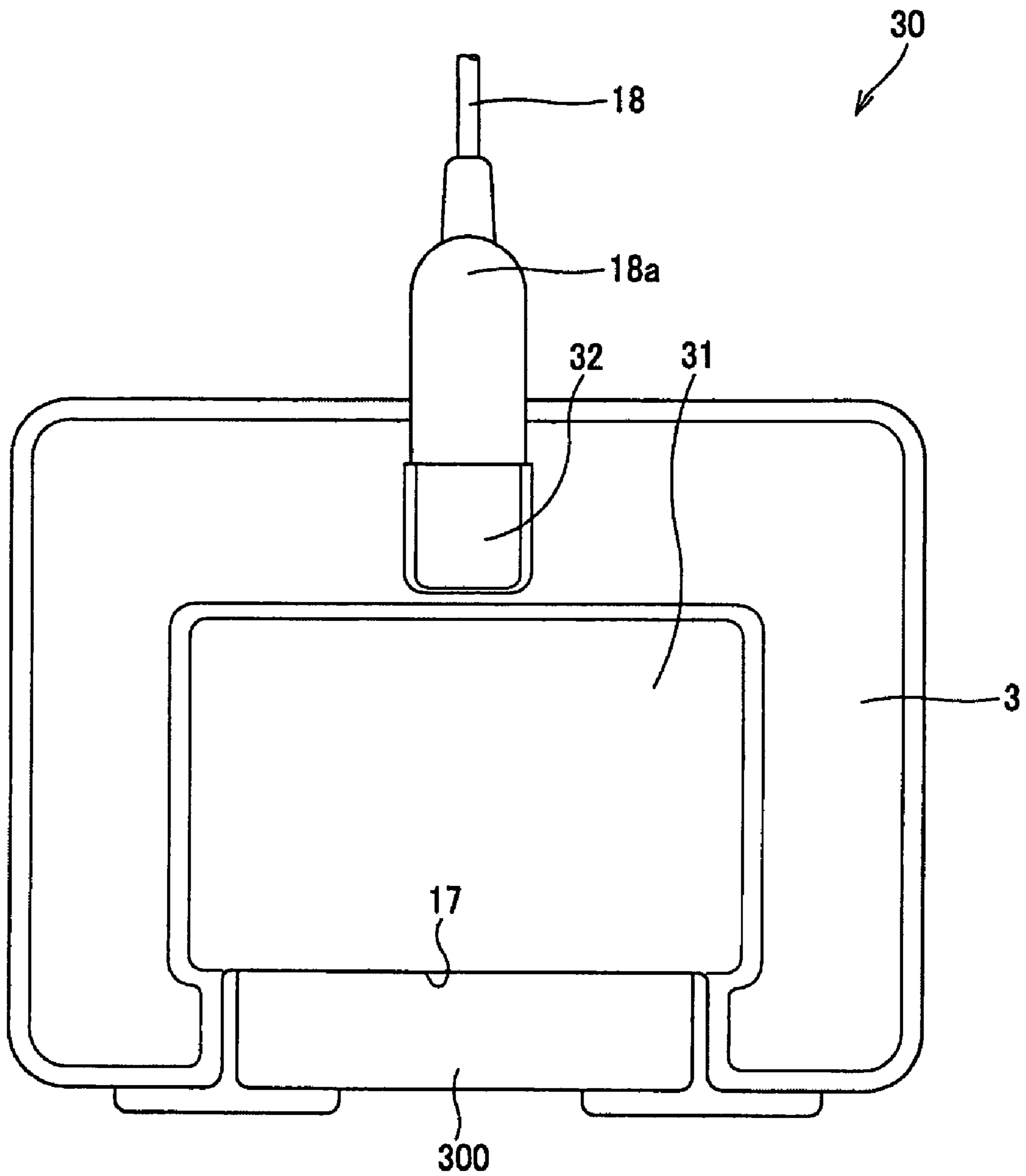


FIG. 7

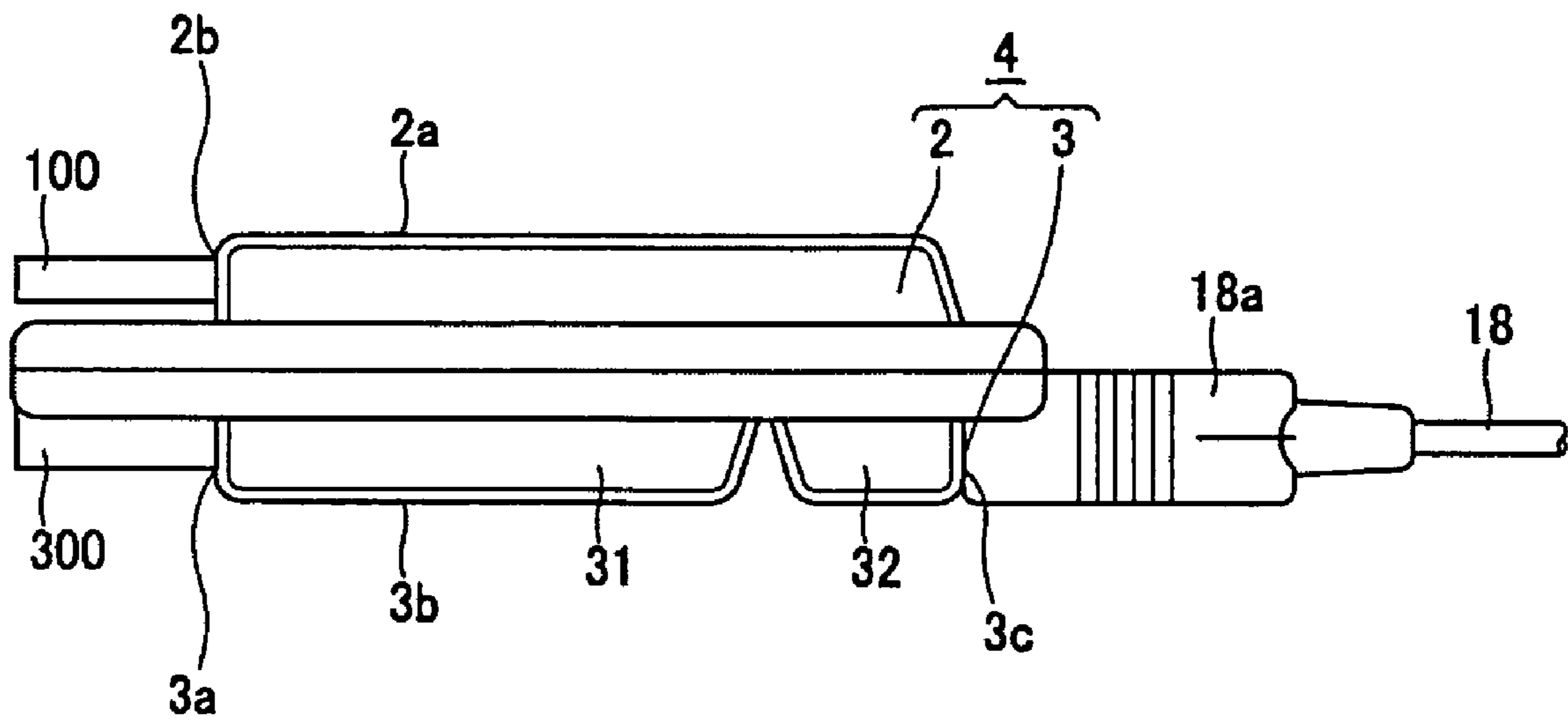


FIG. 8

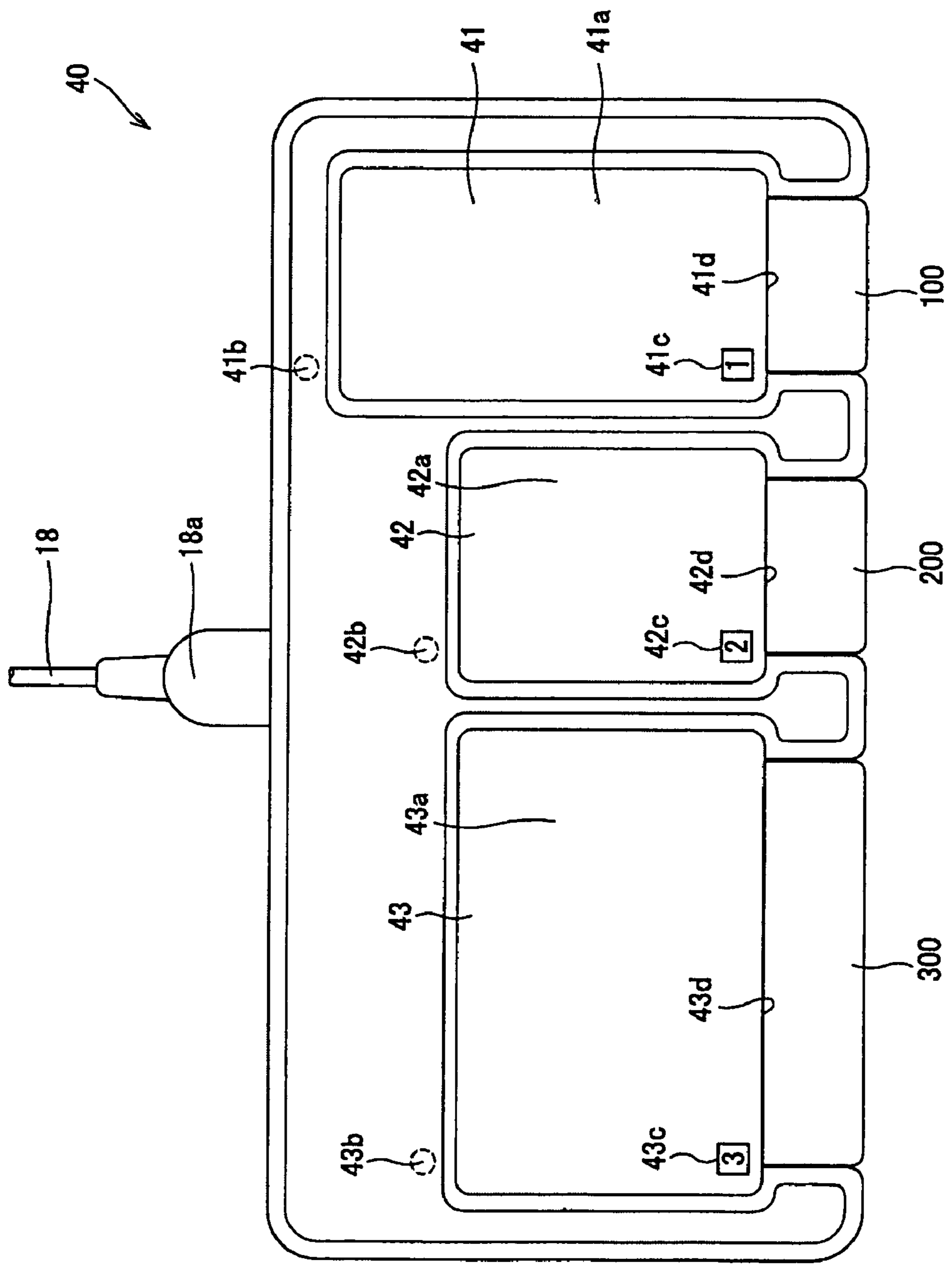


FIG. 9

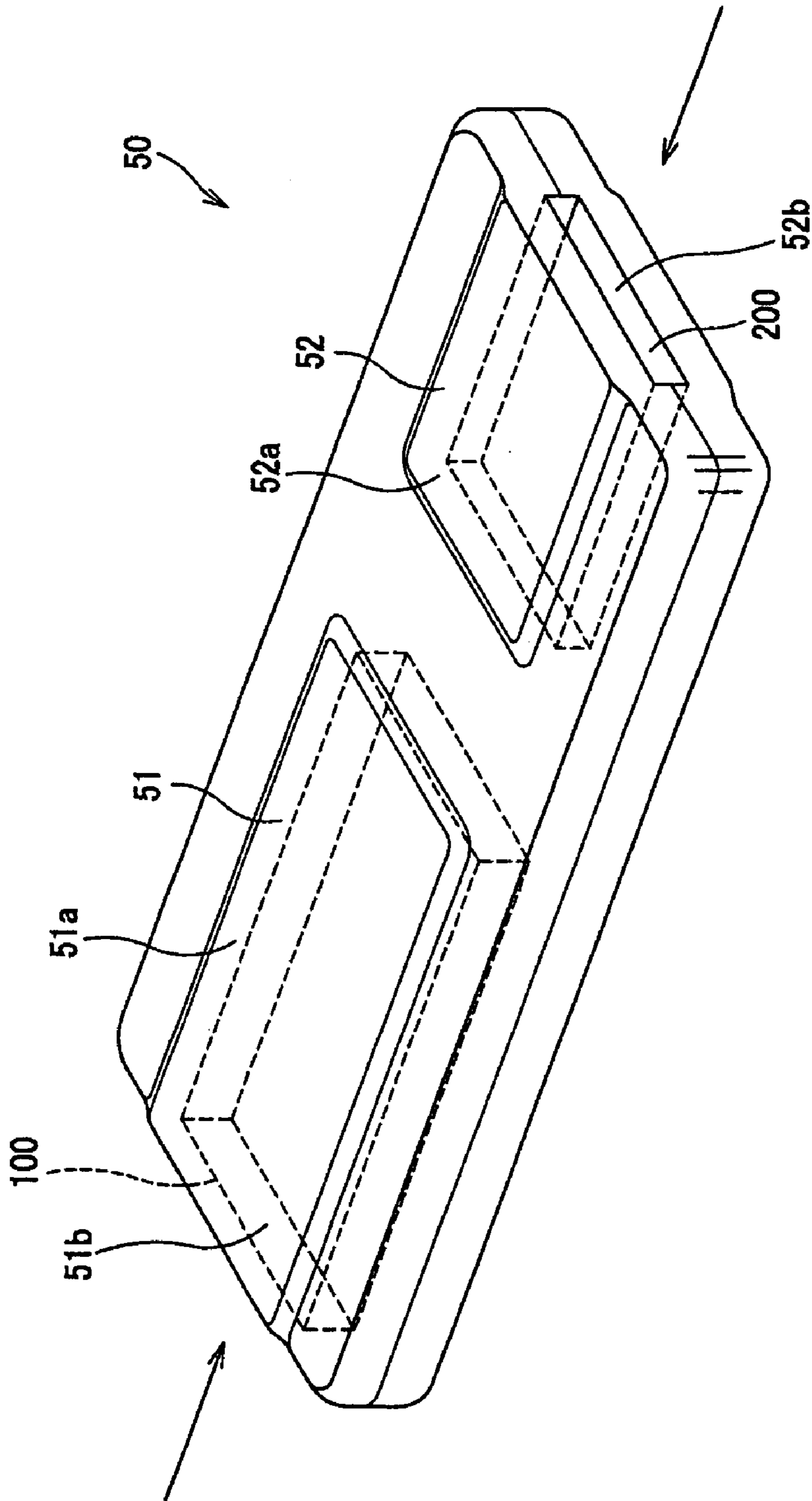


FIG. 10

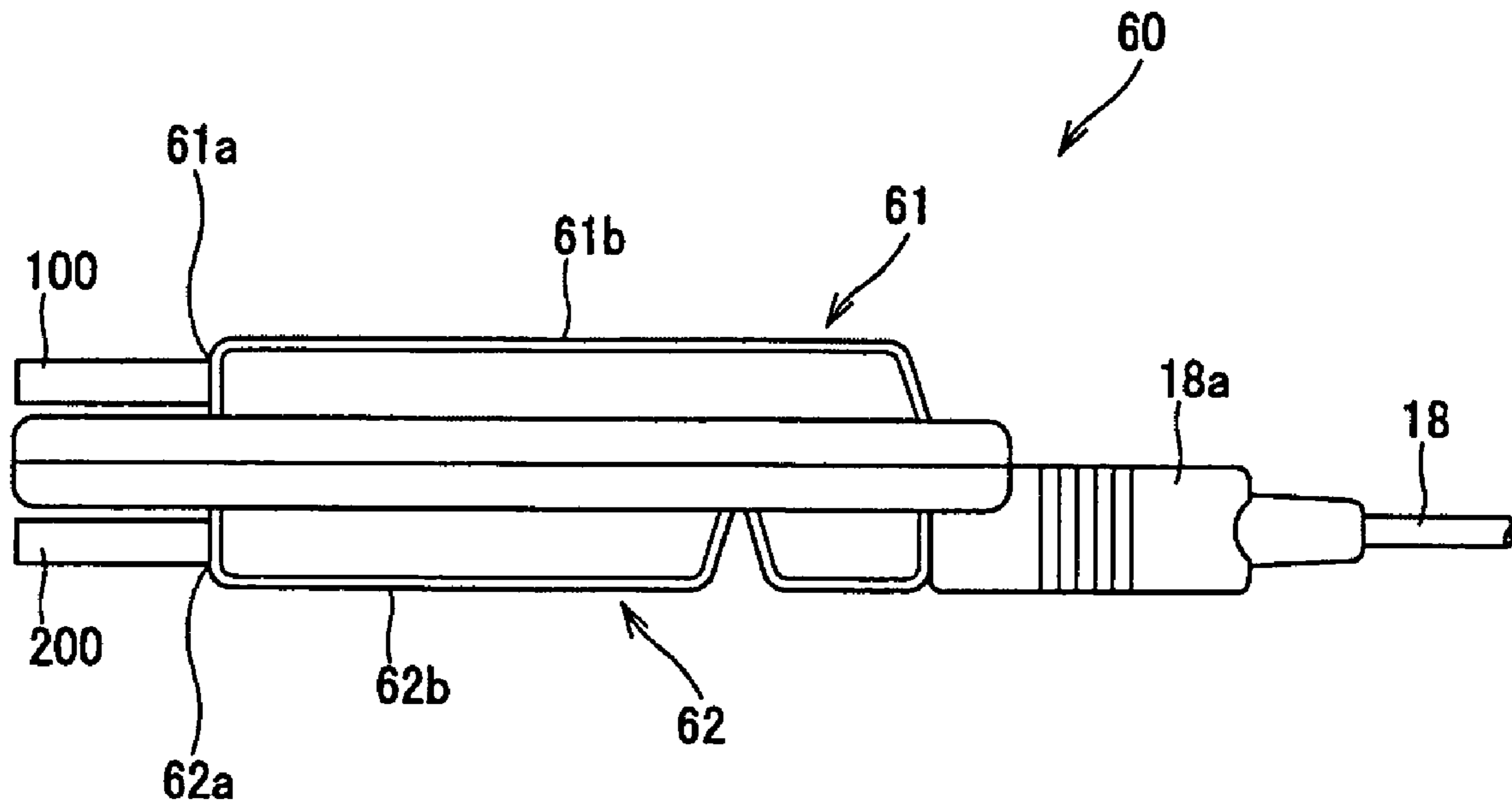


FIG. 11

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LOADING APPARATUS FOR CARD TYPE RECORDING MEDIUMS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a loading apparatus for card-type recording mediums adapted to receive a plurality of different flat card-type recording mediums.

This application claims priority of Japanese Patent Application No. 2004-033994, filed on Feb. 10, 2004, the entirety of which is incorporated by reference herein.

2. Description of Related Art

Card-type recording mediums such as IC cards, conforming to various different standards are being popularly used. Card-type recording mediums conforming to various different standards can record various data including image data, moving image data, music data, and document data. While such recording mediums may be used for the same or similar purposes, many of them show different profiles and are designed to be used with different interfaces, so that normally it is not possible to use the same loading apparatus for card-type recording mediums of different shapes. Thus, users have to possess different loading apparatuses that can be used with the different card-type recording mediums of different shapes that they have. It may be cumbersome to possess a number of different loading apparatuses.

To avoid this problem, a loading apparatus provided with loading sections, or loading slots, for receiving card-type recording mediums of different shapes has been proposed (see, inter alia, Patent Document: Japanese Patent Application Laid-Open Publication No. 11-110880). Such a loading apparatus is convenient because the user can use card-type recording mediums of different shapes if he or she possesses them. However, when a loading apparatus is equipped with loading slots for receiving card-type recording mediums of different shapes, the user may load a card-type recording medium into an incorrect slot. If the user loads a card-type recording medium deep into an incorrect slot, it may not be possible to remove it. Then, a machine trouble may occur.

SUMMARY OF THE INVENTION

In view of the above identified problem, it is therefore the object of the present invention to provide a loading apparatus for card-type recording mediums having loading sections for receiving card-type recording mediums of different shapes that is adapted to prevent a card-type recording medium from being put into an incorrect loading section.

According to the invention, the above object is achieved by providing a loading apparatus for card-type recording mediums adapted to receive flat card-type recording mediums of at least two different shapes, the apparatus comprising: an apparatus main body, a first loading section continuously extending from a first loading/unloading aperture arranged on the apparatus main body so as to receive a first card-type recording medium, a second loading section continuously extending from a second loading/unloading aperture arranged on the apparatus main body so as to receive a second card-type recording medium, and an interface arranged in the apparatus main body and adapted to be connected to external equipment. A first bulged section is arranged on the first loading section and a second bulged section is arranged on the second loading section, the second bulged section having a size different from that of the first bulged section.

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Thus, according to the invention, a first bulged section is arranged on the first loading section and a second bulged section is arranged on the second loading section of the apparatus main body so that the user can discriminate the first loading section from the second loading section by the difference of position and touch between the two loading sections. Then, it is possible to prevent an IC card from being inserted into an incorrect loading section.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective view of a loading apparatus according to the invention, illustrating how it is operated;

FIG. 2 is a schematic plan view of the loading apparatus of FIG. 1;

FIG. 3 is a schematic front view of the loading apparatus of FIG. 1;

FIG. 4 is a schematic rear view of the loading apparatus of FIG. 1;

FIG. 5 is a schematic bottom view of the loading apparatus of FIG. 1;

FIG. 6 is a schematic lateral view of the loading apparatus of FIG. 1;

FIG. 7 is a schematic bottom view of a loading apparatus according to the invention and provided with a bulged section on the loading section on the bottom side;

FIG. 8 is a schematic lateral view of the loading apparatus of FIG. 7;

FIG. 9 is a schematic bottom view of a loading apparatus according to the invention and provided with three loading sections that are arranged in parallel on one of the major surfaces thereof;

FIG. 10 is a schematic perspective view of a loading apparatus according to the invention and provided with two loading sections that are arranged in series on one of the major surfaces thereof; and

FIG. 11 is a schematic lateral view of a loading apparatus according to the invention and provided with two loading sections, one on the top surface and one on the bottom surface thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now a loading apparatus for IC cards according to the invention will be described by referring to the accompanying drawings.

As shown in FIG. 1, the loading apparatus 1 is an adaptor apparatus having three loading sections for receiving three card-type recording mediums, or IC cards, 100, 200, 300 of different shapes.

Now the three IC cards of different shapes will be described by referring to FIG. 1. The first IC card 100 comprises a substantially rectangular plate-shaped card main body 101 prepared by molding synthetic resin; card main body 101 contains therein a semiconductor memory element, such as a flash memory having a large memory capacity of 4 MB, 16 MB, 32 MB, 64 MB, 128 MB, 256 MB, . . . , 1 GB or 2 GB, a control circuit element having a control circuit section for controlling the operation of writing data to and reading data from the semiconductor memory element, and a plurality of semiconductor integrated circuit elements including a copyright protection circuit element, the elements being mounted on a printed circuit board.

The card main body **101** containing a plurality of semiconductor elements and a printed circuit board on which the semiconductor elements are mounted is made to have a mechanical strength that prevents the card main body **101** from being bent by ordinary external force applied thereto in operation in order to protect the semiconductor memory element and the other elements as well as the printed circuit board on which the semiconductor elements are mounted. More specifically, the card main body **101** is formed by a molded body of synthetic resin.

A terminal section **102** is formed on the front surface **101a** of the card main body **101** of the IC card **100**, which is located on one of the short sides of the card main body **101**, so as to extend from the front surface **101a** to the bottom surface **11b**. A plurality of electrodes **102b** are arranged in the terminal section **102** and separated from each other by partition walls **102a**. The operation of reading data from or writing data to the memory element arranged in the card main body **101** is conducted by way of the electrodes **102b** arranged in the terminal section **102**. Engaging recesses are defined by the partition walls **102a** of the terminal section **102** for their boundaries and the electrodes **102b** are arranged on the bottom surfaces of the respective engaging recesses so as to be protected against being touched directly by fingers. For example, a total of ten electrodes **102b** may be arranged in the respective engaging recesses.

Thus, the first IC card **100** is provided with ten electrodes **102b** in the terminal section **102**. Data are exchanged between the loading apparatus **1**, in which the first IC card **100** is loaded, and a host apparatus typically by way of a serial interface, using the electrodes **102b** arranged in the terminal section **102**. More specifically, the electrodes **102b** include at least one that operates as an input terminal of a serial protocol bus state signal BS, one that operates as an input terminal of a serial protocol data signal SDIO, one that operates as an input terminal of a serial clock SCLK and one that operates as a supply voltage VCC terminal. Data may alternatively be exchanged between the loading apparatus **1** and a host apparatus by way of a parallel interface.

A substantially round chamfered section **103** is formed at one of the corners of the front surface **101a** where the terminal section **102** of the card main body **101** is arranged. A wrong-insertion preventing groove **104** is formed on the lateral surface **101c** of the card main body **101** where the chamfered section **103** is formed by partly cutting out the bottom surface **101b** of the card main body **101** so as to be directly linked to the chamfered section **103**. The chamfered section **103** and the wrong-insertion preventing groove **104** define the direction in which the first IC card **100** is inserted into the loading apparatus **1** and prevents an incorrect card from being loaded in the latter.

The lateral surface **101c** of the card main body **101** also is provided with a fall preventing recess **105** that allows the IC card **100** inserted into the loading apparatus **1** to be engaged with a resilient engaging piece provided on the loading apparatus **1** side and prevents it from falling out of the loading apparatus **1**. An engaging recess **106** to be engaged with the ejection mechanism arranged at the loading section side of the loading apparatus **1** or the host apparatus to eject the first IC card **100** out of the loading section is formed substantially at the middle of the other lateral surface **101d** of the card main body **101**. The engaging recess **106** is formed by cutting out part of the lateral surface **101d** that runs in parallel with the direction of insertion of the first ID card **100** into the loading apparatus **1** or the host apparatus so as to extend to the bottom surface **101b**. It becomes engaged with the ejection mechanism

arranged at the loading section side of the host apparatus only when the first IC card **100** is correctly inserted into the loading/unloading aperture of the loading apparatus **1** or the host apparatus.

The first IC card **100** having the above-described configuration is put into the loading apparatus **1** or the host apparatus by way of the corresponding loading/unloading aperture thereof, using the front surface **101a** where the terminal section **102** is arranged as a leading side.

Now the second IC card **200** will be described also by referring to FIG. **1**. The second IC card **200** is a small IC card, shorter than the first IC card. It has terminals the number of which is equal to that of the first IC card and which are realized according to an electric specification substantially similar to that of the first IC card. The second IC card **200** comprises a substantially rectangular plate-shaped card main body **201** prepared by molding synthetic resin, which card main body **201** contains therein a semiconductor memory element, such as a flash memory having a large memory capacity of 4 MB, 16 MB, 32 MB, 64 MB, 128 MB, 256 MB, . . . , 1 GB or 2 GB, a control circuit element having a control circuit section for controlling the operation of writing data to and reading data from the semiconductor memory element, and a plurality of semiconductor integrated circuit elements including a copyright protection circuit element, the elements being mounted on a printed circuit board.

The card main body **201** containing a plurality of semiconductor elements and a printed circuit board on which the semiconductor elements are mounted is made to have a mechanical strength that prevents the card main body **201** from being bent by ordinary external force applied thereto in operation in order to protect the semiconductor memory element and the other elements as well as the printed circuit board on which the semiconductor elements are mounted. More specifically, the card main body **201** is formed by a molded body of synthetic resin.

A terminal section **202** is formed on the front surface **201a** of the card main body **201**, which is located on one of the short sides of the card main body **201** and operates as a leading side when the second IC card **200** is inserted into the loading apparatus **1** or the host apparatus, so as to extend from the front surface **201a** to the bottom surface **201b**. A plurality of engaging recesses are arranged in the terminal section **202**, and their boundaries are defined by partition walls **202a**, whose number corresponds to that of the electrodes **202b** of the second IC card **200**. The engaging recesses are open at the side of the front surface **201a** and also at that of the bottom surface **201b** of the card main body **201**, so that they may be engaged with a plurality of terminals arranged on the loading apparatus **1** or the loading section side of the host apparatus. The plurality of electrodes **202b** are arranged on the bottom surfaces of the respective engaging recesses and separated from each other by the partition walls **202a**. Since the plurality of electrodes **202b** are arranged on the bottom surfaces of the respective engaging recesses that are separated from each other and have sizes smaller than that of a finger tip, they are protected from being touched directly by a finger tip or some foreign object of such a size at the time of handling the IC card and hence reliably protected against being contaminated and/or damaged.

Thus, the second IC card **200** is provided with ten electrodes **202b** in the terminal section **202**. Data are exchanged between the loading apparatus **1**, in which the second IC card **200** is loaded, and a host apparatus typically by way of a serial interface, using the electrodes **202b**

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arranged in the terminal section **202**. More specifically, the electrodes **202b** include at least one that operates as an input terminal of a serial protocol bus state signal BS, one that operates as an input terminal of a serial protocol data signal SDIO, one that operates as an input terminal of a serial clock SCLK and one that operates as a supply voltage VCC terminal. Alternatively, data may be exchanged between the loading apparatus **1** and a host apparatus by way of a parallel interface.

A chamfered section **203** is formed at one of the corners of the front surface **201a** where the terminal section **202** of the card main body **201** is arranged in order to allow the user to easily see the right leading edge when inserting the second IC card **200** into the loading apparatus **1** or the host apparatus. A wrong-insertion preventing groove **204** is formed on the front surface **201a** and the lateral surface **201c** of the card main body **201** where the chamfered section **203** is formed by partly cutting out the bottom surface **201b** of the card main body **201** so as to be stepped back from the bottom surface **201b** of the card main body **201**. The wrong-insertion preventing groove **204** is provided with a protrusion **204a** that is extended from the lateral surface **201c** where the chamfered section **203** is formed and whose top surface is substantially flush with the bottom surface **201b**. As the protrusion **204a** arranged in the wrong-insertion preventing groove **204**, a wrong-insertion preventing recess **204b** is defined in the inside thereof to prevent the IC card **200** from being put into an incorrect loading/unloading aperture of the loading apparatus **1** or the host apparatus. When the second IC card **200** is correctly put into the correct loading/unloading aperture of the loading apparatus **1** or the host apparatus, the wrong-insertion preventing recess **204b** becomes engaged with the wrong-insertion preventing projection arranged in the loading apparatus **1** or the host apparatus to allow the second IC card **200** to be loaded in it. The wrong-insertion preventing recess **204b** differs from the wrong-insertion preventing groove **104** of the first IC card **100** in terms of profile so that the second IC card **200** is prevented from being mistakenly inserted into the loading section for the first IC card **100** by the difference of profile.

The bottom surface **201b** of the card main body **201** where the chamfered section **203** is formed is provided at a position near the wrong-insertion preventing groove **204** with a fall preventing recess **205** for preventing the second IC card **200** from falling from the loading section for the second IC card **200** when the second IC card **200** is loaded into the loading apparatus **1** or the host apparatus. The fall preventing recess **205** is formed by cutting out the lateral surface **201c** running in parallel with the direction in which the second IC card **200** is inserted into the loading apparatus **1** or the host apparatus and the bottom surface **201b** of the second IC card **200**. The fall preventing recess becomes engaged with the fall preventing piece arranged on the loading apparatus **1** or the host apparatus only when the second IC card **200** is correctly inserted into the loading/unloading aperture of the loading apparatus **1** or the host apparatus.

An engaging recess **206** to be engaged with the ejection mechanism arranged at the loading section side of the loading apparatus **1** or the host apparatus to eject the second IC card **200** out of the loading section is formed on the bottom surface **201b** of the card main body **201** where the chamfered section **203** is formed. The engaging recess **206** is formed by cutting out part of the lateral surface **201d** that runs in parallel with the direction of insertion of the second IC card **200** into the loading apparatus **1** or the host apparatus so as to extend to the bottom surface **201b**. It becomes engaged with the ejection mechanism arranged at

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the loading section side of the host apparatus only when the second IC card **200** is correctly inserted into the loading/unloading aperture of the loading apparatus **1** or the host apparatus.

The second IC card **200** having the above described configuration is put into the loading apparatus **1** or the host apparatus by way of the corresponding loading/unloading aperture thereof, using the front surface **201a** where the terminal section **202** is arranged as a leading side.

Now the third IC card **300** will be described. The third IC card **300** is an IC card whose electric and physical specifications differ from those of the first IC card **100** and those of the second IC card **200** and which has a substantially rectangular profile. The front surface **300a** of the third IC card **300** that runs along one of the long sides of the rectangle and operates as the leading side of third IC card **300** is provided with a plurality of terminal sections **300b**. The third IC card **300** is provided at the lateral surfaces thereof that run in parallel with the direction of insertion of the third IC card **300** with respective insertion guide grooves **301**. While the first and second IC cards **100**, **200** are provided at the sides thereof that operate as leading sides when the cards are inserted into the loading apparatus **1** or the host apparatus respectively with chamfered sections **103**, **203**, the third IC card **300** is not provided with any chamfered section for identifying the leading side thereof when the IC card **300** is inserted into the loading apparatus **1** or the host apparatus. The third IC card **300** having the above-described configuration is loaded into the loading apparatus **1** or the host apparatus through the loading/unloading aperture of the loading apparatus **1** or the host apparatus, using the front surface **300a** thereof where the terminal sections **300b** are arranged as leading side.

Thus, the second IC card **200** has an electric specification that is substantially similar to that of the first IC card **100**, but it shows a plan view different from that of the first IC card **100** because its long sides are much shorter than those of the first IC card **100**. The third IC card **300** has long sides and short sides whose lengths differ from those of the first IC card **100** and those of the second IC card **200**. The loading apparatus **1** of the present invention receives these three IC cards **100**, **200**, **300** of different shapes.

Referring to FIGS. **1** through **6**, the loading apparatus **1** for receiving the first through third IC cards **100**, **200**, **300** has an apparatus main body **4** formed by combining an upper case **2** and a lower case **3**. A first loading section **5** and a second loading section **6** for receiving respectively the first IC card **100** and the second IC card **200** are arranged at the side of the top surface **2a** of the apparatus main body **4**, while a third loading section **7** for receiving the third IC card **300** is arranged at the side of the bottom surface **3b** in the apparatus main body **4**. The apparatus main body **4** contains therein a printed circuit board where control circuits and other electric circuits are incorporated and also connectors that correspond respectively to the first through third IC cards **100**, **200**, **300** and are arranged respectively in the first through third loading sections **5**, **6**, **7** that are mounted on the printed circuit board. The first through third loading sections **5**, **6**, **7** are provided with respective ejection mechanisms, fall preventing mechanisms and wrong-insertion preventing mechanisms that correspond to the respective IC cards to be loaded. The first through third loading sections **5**, **6**, **7** are connected electrically to the terminal sections **102**, **202**, **300b**, respectively, of the first through third IC cards **100**, **200**, **300**. The upper and lower cases **2**, **3** are formed by injection molding of synthetic resin. Particularly, the upper case **2** is made of a light-transmitting synthetic resin material

so as to transmit light from identifier lamps, which may typically be LEDs (light emitting diodes) mounted on the printed circuit board contained therein.

The first through third loading sections **5**, **6**, **7** are so sized as to almost entirely contain and hold the first through third IC cards **100**, **200**, **300**, respectively, therein. A first bulged section **8** showing a plan view similar to that of the first IC card **100** to be loaded in the first loading section **5** is formed on the first loading section **5**, while a second bulged section **9** showing a plan view similar to that of the second IC card **200** to be loaded in the second loading section **6** is formed on the second loading section **6**. The first bulged section **8** and the second bulged section **9** show plan views similar to that of the first IC card **100** and that of the second IC card **200**, respectively, so that their profiles differ from each other, and hence it is possible for the user to discriminate and identify the position of the first loading section **5** and that of the second loading section **6** simply by touching them without viewing them for confirmation.

The profiles of the first and second bulged sections **8**, **9** are not limited to the illustrated ones. For example, the first IC card **100** is larger than the second IC card **200**. Therefore, as for the first and second bulged sections **8**, **9**, the first bulged section formed on the first loading section **5** for receiving the first IC card **100** may be made larger than the second bulged section **9** formed on the second loading section **6** for receiving the second IC card **200** instead of making the first and second bulged sections **8**, **9** correspond to the respective contours of the plan views of the first and second IC cards **100**, **200**.

The upper case **2** is provided at the front surface **2b** thereof with a first loading/unloading aperture **11** for receiving the first IC card **100**, which aperture is directly connected to the first loading section **5**, and also with a second loading/unloading aperture **12** for receiving the second IC card **200**, which aperture is directly connected to the second loading section **6**. The first loading section **5** is provided at corresponding positions located respectively above and below the first loading/unloading aperture **11** with a first notched section **13** for exposing a to-be-pinched part of the first IC card **100** loaded in the first loading section **5**, so as to allow it to be pinched typically between the thumb and the forefinger of a hand of the user when the first IC card **100** is pulled out of the loading apparatus **1**. Similarly, the second loading section **6** is provided at corresponding positions located respectively above and below the second loading/unloading aperture **12** with a second notched section **14** for exposing a to-be-pinched part of the second IC card **200** loaded in the second loading section **6**, so as to allow it to be pinched typically between the thumb and the forefinger of a hand of the user when the second IC card **200** is pulled out of the loading apparatus **1**. A third notched section **15** is formed between the first loading/unloading aperture **11** and the second loading/unloading aperture **12** with an aperture formed on the front surface thereof in such a way that the aperture is recessed from the first and second loading/unloading apertures **11**, **12**. The first loading/unloading aperture **11** and the second loading/unloading aperture **12** are aligned with the third notched section **15** interposed between them. Thus, the third notched section **15** separates the first loading/unloading aperture **11** and the second loading/unloading aperture **12** from each other so that the user can easily discriminate them, and a rear surface side to-be-pinched part of the third IC card **300** loaded in the third loading section **7** is exposed so as to be pinched typically

between the thumb and the forefingers of a hand of the user when the third IC card **300** is pulled out of the loading apparatus **1**.

The first bulged section **8** is provided with a first display section **8a** for displaying the type (shape) of the first IC card **100** to be loaded, and the second bulged section **9** is provided with a second display section **9a** for displaying the type (shape) of the second IC card **200** to be loaded. A third display section **7a** is arranged between the first bulged section **8** and the second bulged section **9** for the purpose of displaying the type (shape) of the third IC card **300** to be loaded in the third loading section **7**. The first display section **8a** and the second display section **9a** are arranged on an imaginary line **L1** running in parallel with the long sides of the apparatus main body **4** and dividing the short sides of the apparatus main body **4** into equal lengths, while the third display section **7a** is arranged closer to the front surface of the apparatus main body **4** from the imaginary line **L1**.

First through third access indicator sections **10a**, **10b**, **10c** are arranged on the imaginary line **L1** between the first bulged section **8** and the second bulged section **9** so as to be turned on when the first through third IC cards **100**, **200**, **300** loaded in the first through third loading sections **5**, **6**, **7** are accessed respectively. The first access indicator section **10a** is turned on when the first IC card **100** loaded in the first loading section **5** is being accessed, and the second access indicator section **10b** is turned on when the second IC card **200** loaded in the second loading section **6** is being accessed, while the third access indicator section **10c** arranged at the center is turned on when the third IC card **300** loaded in the third loading section **7** is being accessed. The third access indicator section **10c** is arranged substantially at the middle of an imaginary line **L2** running in parallel with the short sides of the apparatus main body **4** and dividing the long sides of the apparatus main body **4** into equal lengths along with the third display section **7a**.

The first through third access indicator sections **10a**, **10b**, **10c** are arranged in the order of arrangement of the first through third loading sections **5**, **6**, **7** so that each of the first through third access indicator sections **10a**, **10b**, **10c** makes light from the corresponding one of the LEDs mounted on the printed circuit board **4** visible to the user through the light transmitting upper case **2** when the LED is turned on to emit light. In other words, the undulations due to the access indicator sections are minimized to make the surface of the apparatus main body **4** very smooth when touched by hand.

As pointed out above, since the first through third display sections **8a**, **9a**, **7a** are arranged in the order of arrangement of the first through third loading sections **5**, **6**, **7**, it is easy for the user to visually identify the positions of the first through third loading sections **5**, **6**, **7**. Similarly, the first through third access indicator sections **10a**, **10b**, **10c** are also arranged in the order of arrangement of the first through third loading sections **5**, **6**, **7**, so it is easy for the user to visually identify any of the first through third IC cards **100**, **200**, **300** loaded respectively in the first through third loading sections **5**, **6**, **7** that are being accessed by the host apparatus.

Still additionally, the first and second display sections **8a**, **9a** and the first through third access indicator sections **10a**, **10b**, **10c** are aesthetically appealing because they are arranged on the single imaginary line **L1**. Similarly, the third access indicator section **10c** and the third display section **7a** are also aesthetically appealing because they are arranged on the single imaginary line **L2**.

The lower case **3** that is combined with the above-described upper case **2** is formed in such a way that its front surface **3a** is located inside relative to and in parallel with the front surface **2b** of the upper case **2**. The front surface **3a** is provided substantially at the center thereof with a third loading/unloading aperture **16** that is directly connected to the third loading section **7** for receiving the third IC card **300**. The third loading/unloading aperture **16** is located at the bottom of the third notched section **15**. The lower case **3** is provided with a fourth notched section **17** that is recessed from the foremost line of the lower case. The front edge of the fourth notched section **17** is aligned with the front edge of the third notched section **15** of the upper case **2**, but the fourth notched section **17** has a width greater than the third notched section **15**. Thus, the third and fourth notched sections **15**, **17** arranged respectively above and below the third loading/unloading aperture **16** are adapted to expose a to-be-pinched part of the third IC card **300** loaded in the third loading section **7** so as to allow it to be pinched typically between the thumb and the forefinger of a hand of the user when the third IC card **300** is pulled out of the loading apparatus **1**. The lower case **3** is not provided on the bottom surface **3b** thereof with a bulged section that corresponds to the third loading section **7** in order to make the bottom surface of the apparatus main body **4** very flat so that the apparatus main body **4** may be held stable when it is placed on a desk or the like with its bottom surface thereof held in contact with the top surface of the desk. The third loading section **7** is not provided with a bulged section additionally because the third loading section **7** is arranged close to the bottom surface **3b** of the apparatus main body **4** at a level different from the level where the first and second loading sections **5**, **6** are arranged and that is located close to the top surface **2a**, and hence the third loading section **7** can be easily identified without such a bulged section.

The lower case **3** is provided at the rear surface **3c** thereof with a jack **19** for receiving a plug **18a** attached to a cable **18** for connecting the loading apparatus with a computer. The data transmitted from the host apparatus are written to any of the first through third IC cards **100**, **200**, **300** loaded respectively in the first through third loading sections **5**, **6**, **7** of the loading apparatus **1** according to the command transmitted from the host apparatus. Similarly, any of the data stored in the first through third IC cards **100**, **200**, **300** loaded respectively in the first through third loading sections **5**, **6**, **7** of the loading apparatus **1** are read to the host apparatus according to the command transmitted from the host apparatus. The interface between the loading apparatus **1** and the host apparatus is an interface to which power can be supplied to such an extent, and which makes it possible to write data to and read data from any of the first through third the IC cards **100**, **200**, **300**. A USB (universal serial bus) is adopted in the above-described embodiment, although the interface is not limited to a USB and may alternatively be an interface conforming to the IEEE (the Institute of Electrical and Electronic Engineers) 1394 Standard. It may be so arranged that power is supplied to the loading apparatus **1** not from the host apparatus but from a battery contained in the loading apparatus **1** or a commercial power source. The apparatus main body **4** may alternatively be connected to the host apparatus wirelessly.

The above-described loading apparatus **1** is connected electrically to the host apparatus by way of a cable **18** connected to the jack **19** of the apparatus main body **4**. When loading the first IC card **100** into the first loading section **5** by way of the first loading/unloading aperture **11** by using the terminal section **102** of the first IC card **100** as the

leading side, the user can recognize the first loading section **5** by seeing and/or touching the first bulged section **8** and the first display section **8a**. Thus, it is possible to prevent the first IC card **100** from being inserted mistakenly into the second loading section **6** or the third loading section **7**.

Similarly, when loading the second IC card **200** into the second loading section **6** by way of the second loading/unloading aperture **12** by using the terminal section **202** of the second IC card **200** as the leading side. The user can recognize the second loading section **6** by seeing and/or touching the second bulged section **9** and the second display section **9a**. Thus, it is possible to prevent the second IC card **200** from being inserted mistakenly into the first loading section **5** or the third loading section **7**.

Furthermore, when loading the third IC card **300** into the third loading section **7** by way of the third loading/unloading aperture **16** by using the terminal section **300b** of the third IC card **300** as leading side, the user can recognize the third loading section **7** by seeing and/or touching the first bulged section **8** and the third display section **7a**. Thus, it is possible to prevent the third IC card **300** from being inserted mistakenly into the first loading section **5** or the second loading section **6**.

When the host apparatus is accessing any of the first through third loading sections **5**, **6**, **7** containing respectively the first through third IC cards **100**, **200**, **300**, the corresponding one of the first through third access indicator sections **10a**, **10b**, **10c** arranged respectively for the first through third loading sections **5**, **6**, **7** is turned on to prevent the user from mistakenly pulling out the card from the corresponding loading section.

To use the loading apparatus, it is not necessary that all of the first through third IC cards **100**, **200**, **300** are loaded respectively into the first through third loading sections **5**, **6**, **7**. In other words, it is sufficient that only one of the IC cards **100**, **200**, **300** is loaded in the corresponding loading section to operate the loading apparatus.

The first IC card **100** loaded in the first loading section **5** can be pulled out of the first loading section **5** by pinching the to-be-pinched part of the first IC card **100** located at the rear side thereof and exposed from the first notched section **13**. Similarly, the second IC card **200** loaded in the second loading section **6** can be pulled out of the second loading section **6** by pinching the to-be-pinched part of the second IC card **200** located at the rear side thereof and exposed from the second notched section **14**. Likewise, the third IC card **300** loaded in the third loading section **7** can be pulled out of the third loading section **7** by pinching the to-be-pinched part of the third IC card **300** located at the rear side thereof and exposed from the third and fourth notched sections **15**, **17**.

Now another embodiment of loading apparatus according to the invention will be described by referring to FIGS. **7** and **8**. While the third loading section **7** of the above described loading apparatus **1** is not provided with a bulged section, the third loading section **7** of the loading apparatus **30** illustrated in FIGS. **7** and **8** is provided with a third bulged section **31** whose plan view resembles that of the third IC card **300** to be loaded into the third loading section **7**. The third bulged section **31** operates as a contact surface for the loading apparatus **30** when the loading apparatus **30** is placed on a desk or the like. Since the loading apparatus **30** is provided with a first bulged section **8** arranged on the first loading section **5**, a second bulged section **9** arranged on the second loading section **6**, and additionally a third bulged section **31** arranged under the third loading section **7**, it is possible for the user to identify not only the positions of the

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first and second loading sections **5**, **6** but also the top and bottom surfaces of the apparatus main body **4** and the position of the third loading section **7** by touching them. The loading apparatus **30** is provided on the bottom surface thereof with a fourth bulged section **32** at the position of the jack **19** that is flush with the third bulged section **31** in addition to the third bulged section **31**, so that both the third bulged section **31** and the fourth bulged section **32** operate for contact surfaces of the loading apparatus **30** when the loading apparatus **30** is placed on a desk or the like.

FIG. **9** shows still another embodiment of a loading apparatus according to the present invention. In the loading apparatus **40** of FIG. **9**, the first loading/unloading apertures **41d** of the first loading section **41** for receiving the first IC card **100**, the second loading/unloading aperture **42d** of the second loading section **42** for receiving the second IC card **200** and the third loading/unloading aperture **43d** of the third loading section **43** for receiving the third IC card **300** are arranged in parallel with each other near the upper surface and along the same lateral side of the apparatus.

More specifically, the first loading section **41** directly connected to the first loading/unloading aperture **41d** for removably receiving the first IC card **100**, the second loading section **42** directly connected to the second loading/unloading aperture **42d** for removably receiving the second IC card **200** and the third loading section **43** directly connected to the third loading/unloading aperture **43d** for removably receiving the third IC card **300** are arranged side by side between two oppositely disposed short sides of the loading apparatus **40**. The first loading section **41** is provided with a first bulged section **41a** showing a plan view similar to that of the first IC card **100** and the second loading section **42** is provided with a second bulged section **42a** showing a plan view similar to that of the second IC card **200**, while the third loading section **43** is provided with a third bulged section **43a** showing a plan view similar to that of the third IC card **300**. A first access indicator section **41b** is arranged near the first bulged section **41a** so as to be turned on when the host apparatus accesses the first IC card **100** loaded in the first loading section **41** and a second access indicator section **42b** is arranged near the second bulged section **42a** so as to be turned on when the host apparatus accesses the second IC card **200** loaded in the second loading section **42**, while a third access indicator section **43b** is arranged near the third bulged section **43a** so as to be turned on when the host apparatus accesses the third IC card **300** loaded in the third loading section **43**.

Additionally, the first bulged section **41a** is provided with a first display section **41c** for displaying the type (shape) of the first IC card **100** to be loaded and the second bulged section **42a** is provided with a second display section **42c** for displaying the type (shape) of the second IC card **200** to be loaded, while the third bulged section **43a** is provided with a third display section **43c** for displaying the type (shape) of the third IC card **300**. The first through third display sections **41c**, **42c**, **43c** are arranged side by side along a line running in parallel with the long sides of the loading apparatus **40** to make them appear to be aesthetically appealing.

While the first through third loading sections **41**, **42**, **43** are arranged on the same surface of the loading apparatus **40** having the above described configuration, the user can easily identify any of the first through third loading sections **41**, **42**, **43** because the loading sections **41**, **42**, **43** are provided respectively with the first through third bulged sections **41a**, **42a**, **43a**, which are by turn provided respectively with the first through third display sections **41c**, **42c**, **43c**. Hence any

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of the first through third IC cards **100**, **200**, **300** is prevented from being inserted into a wrong loading section.

Now still another embodiment of a loading apparatus according to the invention will be described by referring to FIG. **10**. In the loading apparatus **50** illustrated in FIG. **10**, a first loading section **51** for receiving the first IC card **100** and a second loading section **52** for receiving the second IC card **200** are arranged in series at the sides of the top surface of the apparatus. This loading apparatus **50** is provided with two loading sections for receiving two IC cards of different types (shapes), and no third loading section for receiving the third IC card **300** is provided.

The first loading section **51** is provided with a first bulged section **51a** showing a plan view similar to that of the first IC card **100**, and the second loading section **52** is provided with a second bulged section **52a** showing a plan view similar to that of the second IC card **200**. In this loading apparatus **50**, a first loading/unloading aperture **51b** is arranged at one of the oppositely-disposed short sides of the apparatus and directly connected to the first loading section **51**, while a second loading/unloading aperture **52b** is arranged at the other short side of the apparatus and directly connected to the second loading section **52**.

While the first and second loading sections **51**, **52** are arranged on the same surface of the loading apparatus **50** having the above described configuration, the user can easily identify either of the first and second loading sections **51**, **52**, and hence either of the first and second third IC cards **100**, **200** is prevented from being inserted into a wrong loading section because the loading sections **51**, **52** are provided respectively with the first and second bulged sections **51a**, **52a**.

While the loading apparatus **50** is equipped with a first loading section **51** for receiving the first IC card **100** and a second loading section **52** for receiving the second IC card **200** in the above description, it may be equipped alternatively with a loading section for receiving the first IC card **100** and another loading section for receiving the third IC card **300** or a loading section for receiving the second IC card **200** and another loading section for receiving the third IC card **300**. The first and second bulged sections **51a**, **52a** may be provided with respective display sections for indicating the types (shapes) of the IC cards **100**, **200** to be loaded and respective access indicator sections.

Now still another embodiment of a loading apparatus according to the invention will be described by referring to FIG. **11**. In the loading apparatus **60** illustrated in FIG. **11**, a first loading section **61** for receiving the first IC card **100** is arranged at the side of one of the oppositely-disposed main surfaces and a second loading section **62** for receiving the second IC card **200** is arranged at the side of the other main surface. The first loading/unloading aperture **61a** of the first loading section **61** and the second loading/unloading aperture **62a** of the second loading section **62** are arranged at one of the short sides of the loading apparatus **60** so that the first and second IC cards **100**, **200** can be removably inserted into the loading apparatus **60** from this side. The first loading section **61** is provided with a first bulged section **61b** showing a plan view similar to that of the first IC card **100**, and the second loading section **62** is provided with a second bulged section **62b** showing a plan view similar to that of the second IC card **200**.

While the first and second loading sections **61**, **62** are arranged respectively on the oppositely-disposed main surfaces of the loading apparatus **60** having the above-described configuration, the user can easily identify either of the first and second loading sections **61**, **62** because the

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loading sections **61**, **62** are provided respectively with the first and second bulged sections **61b**, **62b**, and hence either of the first and second third IC cards **100**, **200** is prevented from being inserted into a wrong loading section.

While the loading apparatus **60** is equipped with a first loading section **61** for receiving the first IC card **100** and a second loading section **62** for receiving the second IC card **200** in the above description, it may be equipped alternatively with a loading section for receiving the first IC card **100** and another loading section for receiving the third IC card **300** or a loading section for receiving the second IC card **200** and another loading section for receiving the third IC card **300**. The first and second bulged sections **61b**, **62b** may be provided with respective display sections for indicating the types (shapes) of the IC cards **100**, **200** to be loaded and respective access indicator sections.

While the loading sections of each of the above-described loading apparatuses **1**, **30**, **40**, **50**, **60** are provided with respective bulged sections that correspond to the IC cards **100**, **200**, **300** they receive so that the user may discriminate the loading sections by touching them to prevent any IC card from being inserted into a wrong loading section, it is not necessary that each of the bulged sections shows a plan view that corresponds to that of the related IC card as long as the user can discriminate the loading sections by touching them.

The types (shapes) of the IC cards to be loaded in any of the above described loading apparatus **1**, **30**, **40**, **50**, **60** are not limited to those of the IC cards **100**, **200**, **300**. Nor is the number of loading sections that a loading apparatus according to the present invention comprises limited to the above-described ones. In other words, a loading apparatus according to the invention may comprise four or more than four loading sections that are provided with respective bulged sections.

What is claimed is:

1. A loading apparatus for card type recording mediums adapted to receive flat card type recording mediums of at least two different shapes, the apparatus comprising:

an apparatus main body;

a first loading section continuously extending from a first loading/unloading aperture arranged on the apparatus main body so as to receive a first card type recording medium;

a second loading section continuously extending from a second loading/unloading aperture arranged on the apparatus main body so as to receive a second card type recording medium;

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an interface arranged in the apparatus main body and adapted to be connected to external equipment;

a first bulged section being arranged on the first loading section of the apparatus main body; and

a second bulged section being arranged on the second loading section, the second bulged section having a size different from that of the first bulged section.

2. The apparatus according to claim **1**, wherein the first bulged section is formed to show a plan view similar to that of the first card type recording medium and the second bulged section is formed to show a plan view similar to that of the second card type recording medium.

3. The apparatus according to claim **1**, wherein the first and second loading sections are arranged in parallel with each other in the apparatus main body.

4. The apparatus according to claim **3**, wherein the first loading section and the second loading section are arranged at the side of one of the oppositely disposed main surfaces of the apparatus main body and a third loading section is arranged at the other side of the apparatus main body and continuously extending from a third loading/unloading aperture formed at one of the lateral sides of the apparatus main body so as to receive a third card type recording medium.

5. The apparatus according to claim **1**, wherein the first loading/unloading aperture and the second loading/unloading aperture are arranged at a lateral side of the apparatus main body and aligned with each other.

6. The apparatus according to claim **1**, wherein the apparatus main body is provided at a position between the first loading/unloading aperture and the second loading/unloading aperture with a notched section formed by cutting out the lateral side.

7. The apparatus according to claim **4**, wherein the third loading/unloading aperture is arranged along a line parallel to a lateral side of the apparatus main body and recessed from the lateral side.

8. The apparatus according to claim **1**, wherein the first loading section and the second loading section are arranged in series in the apparatus main body.

9. The apparatus according to claim **1**, wherein the first loading section is arranged at the side of one of the oppositely disposed main surfaces of the apparatus main body and the second loading section is arranged at the side of the other main surface of the apparatus main body.

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